No. 19833

IN THE

United States Court of Appeals

FOR THE NINTH CIRCUIT

RECOLD CORPORATION,
a corporation, and
LESTER K. QUICK,

Appellants,

vs.

DAVID A. NURSE, dba
DAVID A. NURSE COMPANY, and
HUGH ROBINSON & SONS, a
corporation,

Appellees.

APPELLANTS' OPENING BRIEF

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APPELLANTS' OPENING BRIEF

This appeal is from a judgment of the United States District Court for the Southern District of California holding invalid the Lester K. Quick Patent No. 2,953,906, granted September 27, 1960, for Refrigerant Flow Control Apparatus.

STATEMENT OF JURISDICTION

The jurisdiction of this Court and of the District Court is within the provisions of 28 U.S.C. § 1338(a) and the jurisdiction of this Court to review the judgment of the District Court is within the provisions of 28 U.S.C. § 1291. The Kramer-Trenton Company, manufacturer of the Thaw Systems, is defending, paying all costs, directing and controlling the defense.

STATEMENT OF THE CASE

Subject Matter

In refrigeration, particularly as employed commercially and operated at below freezing temperatures, a problem has long existed in the elimination of the frost which accumulates on the evaporator surface. This frost must be eliminated or its formation controlled because it would otherwise effectively reduce the efficiency of the heat transfer so that refrigeration would stop and the temperature within the refrigerated space rise to unwanted heights. Many systems have been developed for the removal of the frost in commercial refrigeration which in this respect differs quite radically from home-type refrigeration units which are normally operated at or above freezing. The refrigeration system most universally employed is the closed cycle type and includes a compressor and piping leading from the compressor to the condenser in which refrigerant compressed in the compressor is cooled so that it liquefies, then passes to a receiver and from the receiver passes to an expansion valve which controls the rate of flow and pressure conditions of the refrigerant passing into the evaporator. This side of the closed refrigeration cycle is known as the high pressure side.

In the evaporator the liquid refrigerant takes on heat from the surroundings with the result that the refrigerant is evaporated. The evaporation of the liquid refrigerant in the evaporator is at a relatively low temperature, very materially below freezing and the evaporation is caused to take place within refrigeration tubes normally having finned surfaces to give a relatively large area for contact with the air in the refrigerated space. The air is circulated over the finned tubes by a fan cooling the air and reducing the temperature within the refrigerated

space. Water in the air deposits upon the tubes and fins in a form of "frost" which, if allowed to build up, would inhibit the flow of air over the surfaces and act as an effective insulator to prevent the transfer of heat from the air to the refrigerant within the evaporator. Thus, periodic defrosting is required in commercial refrigeration units.

Many systems were developed for defrosting, the most commonly employed at the time of the invention of the system disclosed in the Quick patent in suit being "water defrost". Water defrost was developed by appellants and was licensed throughout the country. The water defrost patent was sustained by this Court in *York v. Refrigeration Engineering,* 168 F.2d 896. However, water defrost presented many problems, and even though it was the best then in existence, it left many things to be desired. This system is reviewed in the article "Automatic Defrost" written by Otto J. Nussbaum, Chief Engineer of Kramer-Trenton Company, in the paper, Exhibit 6B, given at the Annual Meeting of the American Society of Refrigeration Engineers in Miami Beach, Florida, June 3-5, 1957. Kramer-Trenton Company was one of the licensees of the McAdam water defrost patent. It has long been known that the most economical method of defrosting was the "hot gas" system of defrosting which was developed as early as 1888 and its basic fundamentals are described in a German patent issued in 1888, Exhibit 6B, page 1.

The system of hot gas defrost could not be and was not widely used for reasons which are fully explained in the publications which are exhibits in this cause and because of the difficulty of "slugging" the compressor with the ultimate destruction of the compressor and danger to the operator as explained in the article which appeared in Industrial Refrigeration, December 1955 issue, Exhibit

32 herein. This article describes the problems encountered with respect to hot gas defrosting and pictorially illustrates the damaged compressor caused by slugging of the compressor. It was at this stage of this art that Lester K. Quick, a refrigeration serviceman, operating in Eugene, Oregon, was called upon to make an installation of refrigeration in a supermarket in Eugene, Oregon. Lester K. Quick was thoroughly acquainted with all refrigeration systems then in existence. Quick bought a Larkin system which was a modified hot gas defrost system and installed the same in the market and the system failed in use. He was required to make the system work and it was under this necessity that the invention of the patent in suit was born. Quick installed the system of his invention in this market on an experimental basis, and as subsequently modified it became the subject matter of the successive applications for patent filed by Lester K. Quick, the first of which was filed December 4, 1953, assigned Serial No. 396,115, and was entitled "Accumulator Trap for Refrigerating Systems", and is Exhibit 2 included in Volume 3 of the transcript here on appeal. This application was subsequently revised and a second application was filed by Lester K. Quick, Serial No. 436,784 on June 15, 1954, entitled "Refrigerating Apparatus". A substitute for this application was filed, being application Serial No. 506,784, filed in the Patent Office on May 9, 1955, as a continuation-in-part of the prior filed application, and it is upon this application that the patent No. 2,953,906 was granted and issued.

Throughout this period of time experimentation and testing of the Quick system of defrosting continued even after the invention was licensed to appellant Recold Corporation.

Recold Corporation learned of the possible Quick solution to the problem of hot gas defrosting and its Presi-

dent and Chief Engineer contacted Quick in Eugene, Oregon, and entered into an option agreement with Quick, dependent upon two factors: (1) the development of the question of novelty of the invention; (2) the further experimentation to determine whether or not Quick's solution to the problem was adequate to meet all problems of the refrigeration industry as those existed in the commercial fields under all varying conditions of operation. Recold Corporation investigated both factors and proved to its satisfaction that Quick had indeed solved the problem in a patentable manner.

Refrigeration systems, as is well known to this Court and to all, are systems that must operate continuously without breakdown or shutdown, particularly where the operations are carried on to freeze food. A breakdown in the refrigeration system such as occasioned by slugging of the compressor could result in the loss of the entire product or products under refrigeration before adequate repairs could be made.

After being satisfied with its proofs that the Quick discovery did amount to a solution to the problem under all conditions of operation, the plaintiff appellant Recold Corporation exercised its option. The system of refrigeration and defrosting Recold Corporation was then offering to the trade was the water defrost system. Within a short period of time after Recold exercised its option and began the commercial exploitation of the Quick hot gas defrost system, it substantially replaced the water defrost system. Its great commercial success is shown by the rapidity with which it overtook the then universally licensed water defrost system. This is shown, as it was to the Patent Office (Exhibit C, page 60 thereof, Defendants' Book of Exhibits, Volume 4). Recold Corporation began its sale of the elements of the Quick invention in 1955, selling in the first year 49 such units. In four

years, namely, in the year 1959 the volume of business rose from approximately $14,000 in 1955 to $648,000 in 1959. As shown by the record the equipment sold by Recold Corporation is not the entire equipment as illustrated in the Quick patent in suit but includes the evaporator, the metering trap 60 and in some cases the condenser 14 with the necessary valving which in this case is of a limited character. It does not include the sale of the compressors.

It thus appears that for the first time the problem which prevented the widespread use of the hot gas defrost system since 1888 had been solved. Quick was the first to devise a method *which did not require complete re-evaporation of the liquid refrigerant* resulting from defrosting in the low pressure side of the closed system of refrigeration before that refrigerant could be returned to the compressor.

It is fundamental in the consideration of this case to consider the representation made to the Court by the defendants and on behalf of Kramer-Trenton Company as to the defendant appellees' theory of defense of this case. This theory is based upon the belief even in appellees' presentation of its case to the District Court that the Thaw system charged to infringe the Quick patent in suit operated to completely re-evaporate the liquid refrigerant before it could reach the compressor. It was shown to the Court that as a matter of fact through the very simple arithmetic of the system large quantities of liquid refrigerant would be returned to the compressor if it were not for the Thaw system use of the metering accumulator invented by Quick and borrowed in toto from the Recold system.

Kramer-Trenton had, since 1945, sold its Thermobank system before copying the Quick invention in about 1960.

Thus, imitation alone has been held to establish invention. *Florence-Mayo Nuway Co. v. Hardy et al.,* 168 F.2d 778, 782 (C.A. 4, 1948), and *Neff v. Cohu,* 298 F.2d 82, 87 (C.A. 9, 1961).

The entire thesis of the Kramer-Trenton Company Thermobank system is predicated upon the necessity of having a sufficient "heat bank" to which the liquid refrigerant flows after leaving the evaporator to completely re-evaporate the liquid refrigerant. With this belief, as expressed through the teaching of Kramer-Trenton in its Thermobank system and in its review of the existing systems of defrosting as shown by Exhibits 6A, 6B, 6C, and 6D, Kramer-Trenton Company inspected a Recold Vapomatic (Quick) system at a 1955 exhibit at an industry meeting. After this inspection, and after Recold's phenomenal success with the system of Quick's invention, Kramer-Trenton Company brought out its Thaw system, copying in its entirety the Quick invention and the metering accumulator as a means of avoiding the great expense incident to such installations as the Thermobank system.

In this case, therefore, we have (1) a long existing problem; (2) a solution to that problem brought about by necessity; and (3) opportunity, after inspection and examination of the literature with respect to the patented system, to copy the invention and subsequent copying thereof, including that most essential element thereof, the metering accumulator as used in the suction line and which metering accumulator includes a calibrated metering tube which it is stated in the Thaw Bulletin Exhibit 9 provides a positive control of the liquid refrigerant:

> "CONTROL OF THE LIQUID is positive by the use of a calibrated metering tube during defrost."

SPECIFICATION OF ERRORS

Appellants herein will rely upon the following as specification of errors of the District Court.

1. The District Court erred in holding Letters Patent No. 2,953,906 and each of the claims thereof invalid as anticipated by or as failing to disclose invention over the prior art patents and publications of the art, including the patents to:

(a) Charles F. Kettering No. 1,978,463 of October 30, 1934 (Findings 10, 11, 12, and 23);

(b) Otto J. Nussbaum et al. No. 2,564,310 of August 14, 1951 (Findings 20, 21, 23 and 24);

(c) Albert T. Marshall No. 1,594,422 of August 3, 1926 (Findings 23, and 26);

(d) Richard E. Pabst No. 2,589,855 of March 18, 1952 (Findings 22, 23, and 26);

(e) Thomas-Houston Company (British Patent) No. 554,807 of July 20, 1943 (Findings 13 and 23);

and/or

(f) the printed publication of the article or articles by Thomas H. Hart of February 1951, Exhibit P herein, or the article by Thomas H. Hart of March, 1951, Exhibit Q herein (Findings 14, and 15).

2. The District Court erred in holding with respect to the prosecution of the application for the Quick patent in suit before the United States Patent Office that:

(a) the Examiner of the Patent Office had not considered the Kettering Patent No. 1,978,463 (Finding 12);

(b) the Patent Office had not considered the Nussbaum Patent No. 2,564,310 (Finding 20);

(e) there was in the prosecution of the application before the Patent Office any departure from, or any direct contradiction to, the specification of the patent in suit in the presentation of the matter to the Examiner at the oral interview had with the Patent Office Examiner (Findings 25, and 27);

(d) there was any misrepresentation made to the Patent Office which materially or in any way affected the presentation of this matter to the Examiner or resulted in any action taken by the Examiner (Finding 27).

3. The District Court erred as a matter of fact and law that the elements of the Quick invention were old in the art and in concluding as a matter of law therefrom that the Quick patent was invalid (Conclusions of Law 3, 4, and 5).

ARGUMENT AND LAW APPLICABLE

The Quick Patent No. 2,953,906

The invention made by Quick as defined in the claims of the patent in suit as it was presented to the Patent Office and as differentiated from the prior concept in this art is, when understood, of the utmost simplicity. It proceeds upon the concept which is a direct antithesis of the concept of the prior art and is indeed the direct antithesis of the defendant-appellees' position before the District Court.

The Quick Concept

The Quick concept is that by collecting the large volume of liquid refrigerant condensed during the defrosting, holding that large volume of liquid, and metering it back at a controlled rate into the gaseous refrigerant also bypassing through the suction line, that large volume of

liquid refrigerant could be so dispersed in the gaseous refrigerant as to permit the same to pass through the compressor without liability of damage to the compressor and that this operation could be performed under all conditions met by commercial refrigeration in the field which are very highly variable. The concept of the art prior to the Quick invention is, as will be pointed out, that in order to operate the hot gas defrosting system there had to be complete re-evaporation of the liquid refrigerant produced during the defrosting before the intake of the compressor or, as taught by the art, conditions could be encountered in which there would be compressor destruction.

The Quick conception on the one hand is a slow metering of liquid refrigerant into gaseous refrigerant so that the gaseous refrigerant can carry the liquid refrigerant as it is dispersed in small quantities therein through the head of the compressor without damage. The concept of the prior art was that there must be total re-evaporation of the liquid refrigerant in the suction line. The large quantity of refrigerant referred to is that quantity of liquid refrigerant which is resultant of a defrosting operation where the hot gaseous refrigerant is condensed to a liquid in the evaporator as a result of that hot gaseous refrigerant giving up its heat to melt the frost from the refrigerating surfaces of the evaporator. That this is a large volume of refrigerant is evident from the calculations of the quantity of refrigerant condensed during refrigeration and a specific example calculated being in the order of in excess of fifty pounds during a single defrosting operation even in the accused Thaw apparatus (Tr. Vol. 13, page 1562).

The Prior Art Concept

The prior art concept of the requirement of total re-evaporation of a liquid refrigerant before it could be

returned to the compressor is fully documented through the writings of the personnel of Kramer-Trenton Company and others. Recalling that the hot gas defrost system was first patented in Germany in the 1880's, it remained until Quick of necessity solved the problem of avoiding total re-evaporation in 1953, and actual demonstration to the art that such a system could be commercially used before any widespread attempt was made to use a hot gas defrost system without relying upon such total re-evaporation.

As disclosed in the Quick patent the refrigerant gas is compressed in a compressor 11 and due to the work of compression leaves the compressor at high pressure through line 12 to the condenser 14. The condenser 14 is a heat exchanger and the hot high temperature refrigerant's heat is given up to the surrounding air with the result that refrigerant at the high pressure condenses to a liquid and passes into a receiver from which it passes through the expansion valve 15 to an evaporator 10, which may be of any desired form but which usually in this art consists of a coil of pipes having fins on its exterior to increase its refrigeration surface and through which pipes and over which fins the air is caused to travel by a simple fan. The evaporator is located in the space desired to be refrigerated. The liquid refrigerant after passing into the evaporator takes heat from the surrounding air as it is blown over the refrigerated surface and is evaporated into a gas and then returns through the low pressure line 13 back to the compressor 11 where it is recompressed.

Thus, the closed cycle of refrigeration is completed, and it will be obvious that it is dependent upon two operations, the taking of heat from the gaseous refrigerant by the condenser at high pressure to produce a liquid refrigerant which then again takes on heat of the

refrigerant space and at the low pressure becomes again a gas, and that the work put into this system is primarily that of the compressor plus the cooling and heating effect of the air operating in conjunction with the condenser 14 and the evaporator 10.

The hot gas method of defrosting as it was disclosed in the 1888 patent issued in Germany and as it was known throughout this art from the period of 1888 until Mr. Quick's invention, consisted in taking the hot gas from the compressor through a bypass line 60 which bypasses the condenser and the expansion valve directly through the line 16 to the evaporator 10. Under this condition the evaporator becomes a condenser and the hot gas gives up its heat to the refrigerating surface of the condenser, resulting in melting of the frost from the evaporator surfaces. The refrigerant gas is thus cooled to a point where it is condensed to a liquid. Unless inhibited this liquid will flow directly through the low pressure line back to the compressor in what is known in the art as slugs of liquid refrigerant which, on arriving at the compressor would, unless controlled, completely disrupt the operation of the compressor.

That the art had proceeded from 1888 to the time of the Quick invention upon the concept that to use the hot gas defrost system one must provide means for total re-evaporation of the liquid refrigerant cannot be doubted in view of the extensive writings upon this subject, some of which are those of Kramer-Trenton Company, its President, Israel Kramer, and its Chief Engineer, Mr. Otto Nussbaum. It was the presentation of these facts to the Patent Office that resulted in the allowance of the Quick patent.

The published art introduced during this trial includes many articles written in the nature of reviews of the

available means for effecting a defrosting operation which is in itself significant as showing the extent to which the problem was recognized by the art. In *York v. Refrigeration Engineering,* 168 F.2d 896, where the Court sustained validity of the water defrost patent, the comparison is there made, throughout the transcript of that evidence, between water defrosting and hot gas refrigeration, showing that the water defrost enabled effective defrosting to be accomplished without danger to the equipment while hot gas defrosting, although resorted to on occasion in desperation, was recognized by the art as a system which was too dangerous for general application, although it was recognized that if it could be made dependable it had the advantage of introducing no new or secondary element into the closed system of defrosting, introduce no extraneous heat and did not introduce elements into the system which were expensive or which complicated the operation of the simple closed cycle system of refrigeration.

Refrigeration equipment to be commercially operative must be a system which will operate 24 hours a day, 365 days a year, year in and year out, without failure. Such a requirement for the refrigeration system was obviously not possible to obtain through the known system of hot gas defrosting as will be evident from reading this mass of literature produced by both plaintiffs and defendants below. The real test of the invention in this case is what was the knowledge and belief of the art at the time that Quick entered the field in 1953 and as compared with what Quick demonstrated to the art.

Considering the publications of the art on this basis, we first consider the article written by Israel Kramer, President of the Kramer-Trenton Company, entitled "The 'Thermobank' System" as it was presented to the

American Society of Refrigeration Engineers (A.S.R.E.) at the 32nd Spring Meeting held in June 1945 (Exhibit 6A). This paper thus presented is in the nature of a review of the knowledge of the art at that time of the means available for effecting the defrosting of a refrigeration system of the closed cycle character. Kramer carefully reviews the then well known existing systems. He first delineates the efforts which were made to put into the system electric heaters for effecting melting of the frost by the use of electrical heaters. He reviews these attempts on the second and third pages of his article and succinctly sets forth the advantages and disadvantages of such a system and their shortcomings, and thus in enumerating the disadvantages set forth shows clearly why the attempts to use electric defrosting failed. He then considers the water defrost system which at that time was licensed to the Kramer-Trenton Company and which they used for some period of time under license and under the patent sustained by this Court. The water defrost system as thus delineated by Mr. Kramer was, until the introduction of the Quick system in 1953, by far the most popular system in use and was universally licensed to substantially all manufacturers of refrigeration equipment and was in effect the best solution to the defrost problem then in existence. Its disadvantages are fairly enumerated by Mr. Kramer in the article, Exhibit 6A, on page 4 thereof. A further disadvantage may be expressed and that is the danger of the water drain system to become flooded with the result that upon reactivation of the refrigeration cycle the entire system could be made a frozen mass of ice so that it was impossible under such conditions to maintain the low degree of temperatures required. In other words, a leak in the water defrost system within the refrigerated base was fatal and did occur.

Kramer then reviews the then existing hot gas defrosting system and does in Figure 8 of his article set forth the hot gas system without benefit of any means inhibiting direct flow of condensed liquid refrigerant to the compressor. In discussing this system of hot gas defrost as well as the so-called regenerative hot gas system Mr. Kramer concludes with the statement which summarizes the then knowledge of the art:

> " . . . In order to achieve a completely automatic defrosting system with hot gas, a supply of heat must be instantly available for defrosting under all conditions of operation in order to re-evaporate the condensed refrigerant before it enters the suction valve of the compressor." (Exhibit 6A, page 5, 3rd paragraph).

In order to effect this complete re-evaporation of the liquid refrigerant the Kramer-Trenton Company developed the "Thermobank" System, which system is in effect the establishment of a heat bank of sufficient capacity into which all liquid refrigerant is delivered in the suction line and the capacity of the heat bank is sufficient to effect complete re-evaporation of the liquid refrigerant before it can return to the compressor. The particular precaution is pointed out by Mr. Kramer in this respect on page 7, first column, wherein comparing the heat bank capacity with the requirement of heat, Mr. Kramer states:

> "In some cases it may happen that the ice load accumulated is greater than the amount of heat which the particular 'bank' can supply. When this occurs the liquid will slug back into the compressor intake for a very brief period. Although the compressor can handle some liquid slugging, it is not recommended practice. . . ."

In order to avoid this possibility of slugging the compressor because of insufficient capacity of the "Thermobank" system, this article teaches the introduction into the suction line of a hot gas throttling valve which is throttled down to prevent the flow of refrigerant to the compressor or to control that flow, as Mr. Kramer states, until the first evidence of liquid refrigerant at the compressor disappears, that is, the appearance of frosting of the compressor intake valve. Thus, Mr. Kramer teaches:

> ". . . Normally, this valve remains open, but in the event that liquid is slugging back, it is throttled until frosting at the intake valve at the compressor disappears. . . ." (Exhibit 6A, page 7).

In this "Thermobank" System and because there is a holding therein of the liquid refrigerant until it can be completely "re-evaporated", the hold tank is supplied with an oil return line, the function of which is to return to the crankcase of the compressor any oil which may separate from the liquid refrigerant in the Thermobank and return that oil to the crankcase of the compressor when it is required for lubrication. Of this return line the specific teaching of the Thermobank System is as found in this article:

> ". . . This line is small in diameter, just sufficient to permit the return of oil without allowing liquid refrigerant to drain into the compressor suction." (Exhibit 6A, page 6, third column).

The recognition of this art of the danger of slugging back a compressor is particularly shown in this article, in the comments given at the meeting upon its presentation. Thus, we find on page 9 of this article, the comment given with respect to the possibility of a slug returning

to the compressor and which is clearly pointed out by Mr. C. N. Deverall, a member of the Society:

> "In evaluating the advantages and disadvantages of the system I would list as a decided disadvantage the author's suggestion that the system might 'slug back to the compressor,' a condition that should not be permitted at any time. . . ." (Exhibit 6B, page 9, middle column).

Also the comments of Mr. A. G. Loeffel also contained on page 9, who stated his views with respect to this matter as follows:

> "Hot gas defrosting systems have too often wrecked compressors with liquid slugs due either to incompetent operation or faulty system design. . . ."

It is interesting to note that Mr. Israel Kramer, the author of the article, agreed completely with the observations made by Mr. Deverall and Mr. Loeffel and specifically pointed out the steps in each case taken to avoid all possibility of liquid slugging the compressor when using the Thermobank system. These remarks are found upon the 11th and last page of this presentation.

After the Israel Kramer article (Exhibit 6A) there appeared in this art the article written by Otto J. Nussbaum, then Chief Engineer of the Kramer-Trenton Company (Exhibit 6C) which appeared in the March 1946 issue of Refrigeration Industry and entitled "The Thermobank Simplified". This article is also included as defendants' Exhibit E. This article again seeks to review the then known existing methods of effecting defrosting as compared with the "Thermobank". In this article Mr. Nussbaum demonstrates the complete impracticability of the hot gas defrosting system and after reviewing its operation states:

"The system shown in Figure 1 is therefore impractical for two reasons:

(a) it does not always provide enough heat for complete defrost, and

(b) it would soon cause compressor trouble.

(Exhibit 6C, page 3, first column).

The writer then again reviews the attempts to use an electric defrosting system and comes to substantially the same conclusion with respect to the attempts to use an electric defrosting system as does Israel Kramer in Exhibit 6A, and makes the clear observation that by the time an electric heater could supply sufficient heat to evaporate the liquid refrigerant it is too late as the liquid refrigerant has already reached the compressor, stating:

". . . By the time the electric heater is warm, a large quantity of liquid has already reached the compressor. . . ."

While it was recognized in all of these systems that some re-evaporation of the liquid refrigerant always takes place between the evaporator and the compressor, such exposure of the suction line and other equipment to the atmosphere can not be relied upon to effect evaporation. Thus, Mr. Nussbaum states in this article:

". . . Some of this liquid is evaporated in the suction line and the remainder in the compressor. Unfortunately, the heat supplied to the refrigerant in the suction line and in the compressor is not sufficient to replace the heat given up in the evaporator. This is especially true when the temperature surrounding the compressor is low and the ice accumulation on the evaporator is considerable. Also, the admission of considerable quantities of refrigerant liquid into

> the intake of the compressor frequently proves to be injurious to the machine, especially at high rotative speeds." (Exhibit 6C, pages 2-3).

Thus, Mr. Nussbaum establishes that the knowledge of the art in March 1946 was that one could not rely upon exposure of the suction line or other elements of the closed cycle refrigeration system to the heat of the surroundings to effect re-evaporation of the liquid refrigerant and that to do so would probably result in injury to the compressor.

Significantly, Mr. Nussbaum in his article points out what is in use at the time of his article and lists these on page 2 thereof and then proceeds to make a careful analysis of each system, its shortcomings and its failure to meet the problems and any fair reading of this article will show that at any time hot gas defrosting is attempted to be used it could only be used by introducing into the system a second means which acts as a re-evaporator to re-evaporate all liquid refrigerant before it can reach the compressor. Thus, in speaking of the system shown and other forms illustrated, he points out that hot brine has been used in the system as shown in Figure 3 of his article and that hot brine is flame heated in order to provide the necessary heat to "re-evaporate the refrigerant liquid as soon as defrost starts." (Page 3, center column, second paragraph).

In this article Mr. Nussbaum then discusses the Thermobank System and elaborately sets forth the structure and the particular pains taken to be sure that the Thermobank actually has a sufficient heat hold capacity to re-evaporate all liquid refrigerant before it can be returned to the compressor. Thus, Mr. Nussbaum states:

> ". . . The refrigerant, with a much lower heat content, is now in a liquid state and proceeds through

> the suction line to the inner tank, where it is re-evaporated. In re-evaporating, a new quantity of heat is gained by the refrigerant which is used for further defrosting. The evaporated refrigerant proceeds through the top of the unit into the suction intake of the compressor. This cycle continues until defrost is complete." (Exhibit 6C, page 4, columns 1-2).

The entire thesis of this article is to elaborate upon the knowledge then prevalent in this art that when a hot gas system of defrost is utilized care must be taken to insure under all conditions complete re-evaporation of the liquid refrigerant produced.

In 1951, a further article appeared likewise reviewing the methods of defrosting then available and entitled "Methods of Defrosting Commercial Refrigerating Equipment", Plaintiffs' Exhibit 12, written by R. H. Luscombe, General Sales Manager, Penn Electric Switch Co., and presented at an educational conference held January 26-27-28, 1951. This article again reviews the available methods of defrosting, both above freezing and below freezing refrigeration systems and the evaporators thereof and lists the shortcomings of each and all of these systems, including water defrost, both manual and automatic, electric defrost, and hot gas method, and in speaking of the hot gas method again admonishes the art that if the evaporator becomes heavily iced some difficulties and faulty operation may result because of these frozen evaporators, and when speaking of the hot gas defrost and its method of use on page 5 thereof, states the common conception of the art at that time, i.e., the use of re-evaporator coils on the return line, stating:

> ". . . We might mention some variations employed by fixture manufacturers. They include the use of

> re-evaporator coils on the return line. These coils are equipped with fans which are operated only during the defrost cycle so that heat from the surrounding air is collected into the system to speed up the defrosting function. . . ."

The article then concludes with a review of the hot gas Thermobank system and discusses the use of the heat bank as a means of storage of heat during the operating cycle in an anti-freeze solution as a means of re-evaporating the liquid refrigerant before it is returned to the compressor. The knowledge of the art as it thus existed at this time is summarized in these articles and further in the articles written by Mr. Thomas H. Hart and which were presented at the American Society of Refrigeration Engineers in 1951 and which are here in evidence as Defendants' Exhibits P and Q. Any fair reading of these articles will, without taking isolated sections or sentences therefrom, convince any fair minded reader that the hot gas system of defrosting was unreliable, would result in danger to compressors, and the solution to the problem there presented lay in the re-evaporation of the liquid refrigerant before it could be returned to the compressor. The two articles, Exhibits P and Q, are successive and it is stated that they were to be considered together, and in Exhibit Q the teachings of the two articles are summarized in the following statement with respect to the reverse thermal method (hot gas) of operation:

> ". . . In actual operation there will be no question whether or not liquid is reaching the compressor for if it does the compressor will rattle and thump and dance with awe inspiring convulsions."

And with respect to the use of auxiliaries in the line to avoid slugging of the compressor and by the insertion into the line of a trap to hold the liquid refrigerant, Mr. Hart teaches:

> ". . . the suction line within the refrigerated space should not be trapped for a trap in the suction line would quite likely produce a slug which would have to be evaporated before it reached the suction inlet of the compressor." (Exhibit Q, page 1, last paragraph).

and teaches the necessity of re-evaporation under any conditions of operation wherein he states with respect to the slugging of a compressor:

> ". . . The remedy in this case is an accumulator in the suction line arranged to stop the slugs of liquid, allow them to re-evaporate, and at the same time provide for the return of oil to the compressor." (Page 247)

This was the then well known Thermobank System as it was previously described by Mr. Kramer and Mr. Nussbaum in Exhibits 6A and 6C. Mr. Hart was not talking to people who did not know the then existing systems of the art when he presented this paper, and it is quite obvious if we read this entire article, that the teaching of Mr. Hart in both Exhibits P and Q is that liquid refrigerant must be re-evaporated before it is allowed to enter the compressor, no matter whether you use the hot gas defrost system, reverse cycle, or any other system of defrosting. And again Mr. Hart points out the danger of slugging the compressor and that the defrosting system must be designed to eliminate this hazard, stating:

> ". . . Since no compressor is designed to take slugs of liquid refrigerant or oil, every installation should be designed to eliminate this hazard from other causes. . . ." (Exhibit Q, page 246).

Consistent with the knowledge of this art as it is shown to have existed at that time, the patentee Quick in the

Fall of 1953 installed at Emery's I.G.A. Store in South Salem, Oregon, a Larkin system (Finding of Fact 7), which system was a simple hot gas defrost system with the result:

> "The coil defrosted but the compressor jumped up and down and made all kinds of noises indicating that it was digesting liquid, which it should not.
>
> Q Was it necessary for you to make a change?
>
> A It was positively necessary."
> (Tr. Vol. 3, page 200, line 23 to page 201, line 2)

Quick then sought to add an accumulator to the suction line. Gathering from his experience with the use of the Thermobank system Quick, not being able to purchase an accumulator on the market (Tr. 201), sought how to make such an accumulator and to provide means for evaporating the liquid defrost which might be trapped in the accumulator. The accumulator which Mr. Quick built (Tr. 202) was substantially like that shown in the Quick patent in suit except that as originally constructed the accumulator was wrapped with a pipe containing hot water for the purpose of evaporating the liquid frost trapped therein substantially like the Thermobank concept.

It was at this time that Quick conceived his invention:

> "I began to realize that maybe my preconceived ideas that heat was absolutely necessary to effect hot-gas defrosting were not so. I therefore went back to my shop and started experimenting. Since I had another installation going in my home town only a few blocks from our office, in which we were to install two frozen-food cases, I proceeded to construct a more properly engineered accumulator to

> install on this job as an experiment to see if what I had observed was really true." (Tr. 203)

It is interesting to note that Mr. Quick testified that he purchased a Thermobank system from Kramer-Trenton as a standby unit in case his experiment would not work (Tr. 203). On these jobs Mr. Quick carried on his experimentation and determined that by the use of an accumulator with a metering tube he was able to handle the liquid refrigerant produced during defrost and return it to the suction line, and that it was not necessary in such an operation to effect complete re-evaporation. Quick carried forward his experiments in additional stores (Tr. 206-207) and even in the second of these installations took the precaution to heat jacket with a copper coil his accumulator because, as stated by Quick, Tr. 209, line 17):

> "Because I still could not believe that you could defrost without heat. I thought we had to have heat to be able to re-evaporate the liquid and to keep from damaging the compressor."

Quick then filed in the Patent Office his first application, Exhibit 2 herein, which was filed December 4, 1953, Serial No. 396,115. Quick sent copies of this application to manufacturing concerns engaged in this type of business, including both appellant Recold Corporation herein and the Kramer-Trenton Company, Tr. 213. The President, H. T. Jarvis, and Daniel D. Wile, the Chief Engineer of Appellant Recold Corporation visited Mr. Quick in Eugene, Oregon, with the result that Mr. Quick took these individuals to the installations which he had made (Tr. 216). Shortly thereafter an option was signed, dated October 18, 1954, which contemplated Recold Corporation carrying on further experimentation to determine whether the Quick solution could be commercialized (Tr.

218), at which time it was determined that it was advisable to file the third continuation-in-part application Serial No. 506,784, filed May 9, 1955 (Tr. 220).

Operating under this option Recold Corporation, appellant herein, placed in the field certain installations on an experimental basis to determine whether or not the Quick solution to the problem of hot gas defrosting had such reliability of operation as to make it commercially practicable under varying conditions of operation and after assuring itself through such experimentation that the Quick solution and invention was practical under varying conditions of operation Recold Corporation exercised its option. Mr. H. T. Jarvis, President of appellant, testified as to the reason for Recold's experimentation with the Quick invention as to the necessity thereof because of the many variable conditions under which such systems were required to operate and because Recold was skeptical that the Quick system could operate under all conditions. Even after acquiring the rights to the Quick invention Mr. Jarvis testified:

> "Q Now, when was it that you actually placed the system on sale or released it, as you say, to the public?
>
> A I can't give you the exact dates, Mr. Lyon, but I would estimate that it was perhaps six months to a year after we started research in our own lab before any system was allowed to be installed even close to the factories where they could be controlled.
>
> Q Yes.
>
> A And those controlled installations went on for a period of — as I stated before, 12 to 18 months." (Tr. Vol. 2, page 53, lines 15 to 24).

and the field installations were only carried on under appellant's (Recold) guarantee that if the units did not work satisfactorily they would be replaced at the sole expense of appellant Recold (Tr. 53-54).

Recold then in connection with its exploitation of the Quick defrosting system and as a necessary adjunct thereto, built a number of demonstration units one of which is Exhibit 15 before this Court to demonstrate to its distributors and customers throughout the country the operation of the Quick method of defrosting and as a necessary adjunct to the instruction of these people that such system would work which was then contrary to the beliefs of those engaged in this art.

Mr. Peter H. Askew, President of Thermal Products, Incorporated, one of Recold's distributors, testified with respect to his purchase of a demonstration unit like Exhibit 15 and as to its use and demonstration, stating the reason therefor:

> "Because there was a lot of skepticism on the sale of this system to the contractors. We had lots of opposition to overcome." (Tr. Vol. 2, page 87).

The reason for this skepticism is demonstrated by the teachings of the art as shown by the published literature heretofore reviewed and in the belief that this system of hot gas defrosting required complete re-evaporation of the liquid refrigerant formed during defrosting before the refrigerant could be returned to the compressor. As demonstrated by Exhibit 15 the liquid refrigerant formed during defrosting is not evaporated before it is returned to the compressor. Exhibit 15 demonstrates the fallacy of this belief and demonstrates that by metering the liquid refrigerant back into the gaseous refrigerant at a controlled rate the compressor will operate without

danger of destruction. And this was the point on which the art required demonstration before it was willing to accept the Quick solution of the problem of defrosting.

The publications in this art which are almost contemporaneous with the introduction of the Quick invention to the trade significantly still taught in 1955 and as late as 1957 the necessity of providing for complete re-evaporation of liquid refrigerant when utilizing the hot gas defrost system. Kramer-Trenton Company in 1956 published its brochure entitled "Kramer presents a new kind of THERMOBANK" (Exhibit 6D), the entire thesis of which is the making available of a greater quantity of heat in the heat bank in order to be more certain that the liquid refrigerant produced during defrost is completely re-evaporated, stating in part:

> " . . . This makes available vastly more heat for fast and complete elimination of liquid refrigerant slugging during defrost." (Exhibit 6D)

Although Kramer-Trenton had the advantage of inspection of the Recold demonstration unit of Exhibit 15 at the Atlantic City Show in June 1955 a further paper was prepared by Otto J. Nussbaum on "Automatic Defrost" which was presented at the June 3 to 5 Meeting of the American Society of Refrigeration Engineers in Miami Beach, Florida, which again reviews the method of defrosting with particular emphasis on "re-evaporation" and re-evaporators and the necessity thereof. This paper (Exhibit 6D) establishes the fact of the long existence in the art of hot gas defrosting and the fact of its patenting in Germany in 1888, establishes the problem of that system of defrosting, establishes that the hot gas system of defrosting met with little success in the art as stated by Mr. Nussbaum:

> " . . . Further progress was slow until 1945 when automatic hot gas defrost, using re-evaporation, was introduced . . . " (Exhibit 6B, page 1, first column).

Obviously Mr. Nussbaum and Kramer-Trenton Company were not willing to even then accept the fact as was demonstrated to them by the Recold Exhibit 15 demonstration that such a system was commercially feasible or operable under varying conditions required to be met by refrigeration apparatus so it is significant that Mr. Nussbaum in his article thus presented in 1957 still teaches the necessity of complete re-evaporation of liquid refrigerant, makes no mention of the Recold demonstration which he had observed but still adheres to the belief of the requirement for complete re-evaporation of the liquid refrigerant when using the hot gas method of defrosting which can be no more evident from a complete review of this article than the summary thereof which states:

> "(4) Complete re-evaporation—therefore positive compressor protection from foodback." (Exhibit 6A, last page)

As previously stated the publications of the art which appeared in 1955 were graphic in their demonstration of the danger which lies in the use of the simple hot gas defrost method. In the article entitled "Ammonia Liquid-Return Systems" written by W. F. Stoecker, Mechanical Engineering Department, University of Illinois, which was printed in Industrial Refrigeration in December 1955, Exhibit 32, there is pictorially illustrated the danger resulting from liquid refrigerant feedback to the compressor and in this respect this article teaches:

> "Since our ultimate aim is to protect the compressor, the solution to the liquid carryover problem may be to evaporate any liquid which does escape the evaporator before it reaches the compressor. (Exhibit 32, page 14, column 1).

This publication recognizes and is relied upon by appellees herein to show the use of an accumulator prior to the Quick invention. The accumulators which were used held the liquid refrigerant until it could be "boiled off". Thus, Stoecker states:

> "A simple device for protecting the compressor if the entrainment of liquid in the suction gas is of a small quantity for a short period of time, is to install a liquid accumulator in the suction line. Any liquid in the suction gas during the rare periods of carry-over collects in the accumulator and slowly boils off into the suction line. (Exhibit 32, page 14, first column).

One such system for avoiding the return of liquid refrigerant to the compressor is illustrated in Figure 3 of this article wherein the accumulator is connected with a liquid trap which is in turn connected with the refrigerant receiver normally receiving liquid from a condenser, and wherein liquid separated out of the suction line is drained by this method through a series of check valves back to the liquid refrigerant receiver. Certainly no one could read this article as prepared by this independent engineer without reaching the conclusion that it was essential to the satisfactory operation of a refrigeration system using hot gas defrost to insure that liquid refrigerant was not returned to the suction line to the compressor.

The Quick patent in suit in its specification and claims teaches and defines a system which is independent of "re-evaporation". This system includes what Quick refers to for convenience as an "accumulator trap", Quick patent, column 2, line 56. This accumulator trap first performs the function in the suction line during defrosting of separating the liquid and gaseous refrigerant present in the suction line, and as described by Quick, column 3,

lines 15 to 23, permits the gaseous refrigerant to return to the compressor substantially unrestricted. The liquid refrigerant is collected in the trap and held to be returned into the gaseous refrigerant at a controlled rate as described by Quick, column 3, lines 23 to 27 inclusive. This return of the liquid refrigerant at a controlled rate in the embodiments of the invention shown by Quick in his patent is accomplished through the use of a metering tube the lower end of which is in the liquid refrigerant in the accumulator trap. The metering tube is of a restricted size and permits the return of liquid refrigerant into the gaseous refrigerant flowing through the accumulator trap at a controlled rate. As described by Quick this rate is determinable by the size, length and degree of suction exerted in the metering tube and that this operation enables the liquid refrigerant to be returned to the compressor without "substantial re-evaporation".

Without Substantial Re-Evaporation

A considerable controversy in this action has resulted from the use of the word "substantial" which in its ordinary dictionary definition is:

> ". . . 6. Considerable; large; as, a *substantial* gain . . ." (Webster's Collegiate Dictionary, Fifth Edition, 1946, page 993)

and:

> ". . . 7. Considerable in amount, value, or the like; large; as a *substantial* gain. . . ." (Webster's New International Dictionary, Second Edition, Unabridged, 1954, page 2514)

The word "substantially" is used in the claims as a result of a discussion of the claims with the Patent Office Examiner at an interview had where there was present

Daniel D. Wile and the undersigned, attorney for Recold Corporation. The word "substantial" was introduced into the claims in recognition of the fact that no container can be set out in the open subjected to external atmospheric pressure and temperature without there being some evaporation of an evaporatable liquid from the interior. The same is true even of a glass of water set out in a room. In time the water will evaporate. The amount of water evaporating from that glass of water is not substantial at any one period of time and the amount of liquid refrigerant evaporating from the accumulator trap of the Quick invention is not material at or during the period of defrosting and return of the refrigeration system to normal refrigeration operation. In other words, what is really implied by the word "substantially" here is that the large or considerable part of the refrigerant collected in the trap is not evaporated and that the system is not dependent upon such evaporation for its functioning but differentiates from evaporation or re-evaporation as the art was taught at that time by the fact that the system operates with return of the liquid refrigerant to the gaseous refrigerant at a controlled rate so that the liquid refrigerant is not returned to the compressor in the suction line at any time as a slug of liquid refrigerant of sufficient magnitude as to cause damage to the compressor. It was this differentiation which was made to the Patent Office Examiner. The words "substantial re-evaporation" was inserted at the Examiner's suggestion to differentiate from the prior art, the operation of which was dependent upon and the teachings of which were that to operate such a system required complete re-evaporation of the liquid refrigerant. It is essential to the consideration of the claims of the Quick patent that this requirement of "without substantial re-evaporation" is with reference to what occurs

in the accumulator trap. Thus, for example, claim 3 states:

> ". . . the liquid refrigerant in said chamber being metered into said outlet leg at a controlled rate to return normally as a stream of gas and liquid to said compressor without substantial re-evaporation of said liquid."

This requirement of "without substantial re-evaporation" has no reference to what may occur after the refrigerant leaves the accumulator.

We therefore approach the prior art and the judgment of the District Court to consider whether the prior art follows the teaching of the publications of this art and the belief of this art as of the time of the Quick invention or whether the prior art teaches that in a defrosting system where large quantities of liquid refrigerant are produced as in commercial operations, systems could operate without re-evaporation of the liquid refrigerant or in accordance with the Quick concept of returning the liquid refrigerant into the gaseous refrigerant at a controlled rate so that the two travel directly to the compressor and are there subject to recompression without danger of damage to the compressor. And as to whether or not these systems of the prior art teach the Quick invention so that the art at 1955, the time of the introduction of the Quick invention to the trade by appellant Recold Corporation, had knowledge of the Quick invention. It is submitted that the published art hereto considered demonstrates the contrary. *Cee-Bee Chemical Co., Inc. v. Delco Chemicals* (C.A. 9, 1958), 263 F.2d 150. The presumption of validity can be overcome only by clear and convincing proof. *Patterson Ballagh Corp. v. Moss* (C.A. 9, 1953), 201 F.2d 403, 406. In sustaining such burden the prior patents and publications cannot

be reconstructed in the light of the patent in suit. *Payne Furnace & Supply Co., Inc. v. Williams-Wallace Co.*, 117 F.2d 823 (C.A. 9, 1941).

In its findings the District Court predicated its judgment primarily upon the disclosures of the patents to Kettering No. 1,978,463, issued October 30, 1934 (Findings 10, 11, and 12); British Patent No. 554,807, issued July 20, 1945 (Finding 13); the articles by Thomas H. Hart, published February and March 1951, Exhibits P and Q (Finding 14); the accumulator tank used in the Thermobank system as an adjunct thereto (Findings 18 and 20) and including the trap shown in the Nussbaum patent No. 2,564,310 (Finding 20); and the Pabst Patent No. 2,589,855 (Finding 22).

Consideration of the published printed art requires an understanding of and a concept of what is described and illustrated in these patents relied upon as prior art. Where there is no ambiguity, no difficulty of comprehension or understanding of the disclosures of such prior publications or patents, this Court is just as competent to evaluate those disclosures and statements as the lower court. *National Lead Co. v. Western Lead Products Co.*, (C.A. 9, 1961), 291 F.2d 447. The findings of the lower court with respect to specific patents in which there is no particular construction or interpretation placed upon such patents in the judgment or specifically shown by the findings, and where no ambiguity is found or asserted, are not findings of the character which must be accepted unless "clearly wrong". The rule of interpretation of the prior publications and patents is also that the patents or publications which were considered by the Patent Office and which are overcome by the patentee in obtaining the grant of his patent when considered by the Patent Office are not anticipatory and do not invalidate the patent granted unless it is specifically shown that the Patent

Office erred in its consideration of such references. *National Sponge v. Rubber Corp.,* 286 F.2d 731, 735 (Reversing D.C. S.D. Cal. C.A. 9, 1961).

In this case there was extensive evidence offered with reference to certain interviews had at the Patent Office prior to the grant of the patent and an offer was made to prove through the witnesses attending such interview the patents that were specifically discussed and considered at such interview. The District Court in effect discarded and refused to consider or receive this evidence. The evidence adduced from what was discussed with the Examiner was as stated by Mr. Wile (Tr. Vol. 4, page 427, lines 15-21):

> "Q Was that discussion had, do you recall, with reference to the Thermobank system and the other art cited?
>
> A Well, the Thermobank system along with the other art was discussed as examples that the industry or that the art had taught, re-evaporation in this type of a defrost system that some form of external heat or re-evaporation was necessary."

It was at this interview that the witness, Mr. Wile, exhibited to the Patent Office Examiner the photographs, Exhibits 14A through 14E, which showed the operation of the experimental set-up at appellant Recold's place of business and demonstrated the operation of the Quick invention similar to the operation or demonstration made by Exhibit 15 (Tr. Vol. 5, pages 470-472).

In the examination of Mr. Wile, he was referred to the file wrapper of the patent in suit, Exhibit C, page 61 thereof, which has reference to the interview had with the Examiner at which the witness Wile was present and which states:

> ". . . Such accumulators are shown in the Nussbaum Patent No. 2,530,440, granted November 21, 1950; the Kleist Patent No. 2,701,455, granted February 8, 1955 on an application filed July 23, 1952; the McGrath Patent No. 2,675,783 filed June 22, 1950, and others."

This affidavit was discussed and its contents were discussed with the Examiner at the interview or interviews where the witness Wile was present. The witness was asked whether there were such others as referred to in the above quoted material and whether or not such others were exhibited to the Patent Office Examiner and the witness replied: "There were".

The witness prepared a list of these patents which were discussed with the Examiner and the list was presented. The witness was prevented from stating what those others were or as to the discussion had with reference thereto by the Court sustaining an objection (Tr. Vol. 8, page 827), at which time on behalf of plaintiffs an offer of proof was made to prove that each of the patents included upon the list prepared by the witness was a matter of discussion with the Examiner of the Patent Office at the time of said interviews and that the list included the patent to Kleist No. 2,701,455; the patent to Smith, No. 2,787,135; the patent to Warneke No. 2,291,363; the patent to Kramer No. 2,440,146, Exhibit JJ; the patent Winkler No. 2,512,758; the patent to Swart No. 2,614,402, Exhibit JJ; the patent to Kettering No. 1,978,463, Exhibit II; the patent to Hanson No. 2,801,523, Exhibit JJ; and the patent to Nussbaum No. 2,564,310, Exhibit II (Tr. 8, pages 828, 829).

After sustaining this objection made to the witness' testimony with respect to the others that were considered by the Patent Office the District Court finally ruled in

effect that the patents contained upon said list and the witness' testimony with reference thereto and as to their having been considered by the Patent Office was admitted subject to the right of counsel of appellees to cross-examine with reference thereto, the understanding being reached with the Court as stated in the transcript at page 840 with respect to the reservation of the right to examine with respect to these "and others" patents. The record will show that subsequent thereto these patents were thoroughly considered by both plaintiffs and defendants in their examination of their experts. It was, therefore, thoroughly established that the particular patents included on this list as herein identified were considered at the time of the presentation of this matter to the Patent Office Examiner at the interview which is directly contrary to the findings of this Court (Finding 12, Tr. Vol. 8, page 826). Also contrary to this evidence is the statement in Finding 20 that the Nussbaum patent No. 2,564,310 was not considered by the Patent Office. These findings are specifically not true. Specifically set before the Patent Office in addition to these Patent Office references is the literature with respect to the Thermobank system, the Nussbaum Patent 2,440,146 of April 20, 1948, and the article by Thomas H. Hart of March 1951 entitled "Hot Gas Defrosting in Commercial Refrigeration", Part II, Exhibit Q, as well as the article which appeared in Industrial Refrigeration of December 1959 written by W. F. Stoecker of the Mechanical Engineering Department of the University of Illinois, Exhibit 32, File Wrapper Exhibit C, page 75, all of which enunciate the claim or teaching of the art of total re-evaporation through the use of extraneous heat as the only means of avoiding the slugging of the compressor. And the distinction was clearly made throughout this presentation to the Examiner of the Quick invention that it differentiated from all known art in its departure from that

teaching that complete re-evaporation was essential to the successful operation of the hot gas defrost system but that the patentee Quick had discovered and proven that he could re-introduce the liquid refrigerant into the gaseous refrigerant at a controlled rate and that when so mixed and controlled the hot gas system was capable of successful operation without danger of damaging the compressor. And in so making this distinction with this long-standing problem relied before the Patent Office upon the Supreme Court's holding in *Diamond Rubber Company of New York v. Consolidated Rubber Tire Company,* 220 U.S. 428, 55 L.ed. 527 at 531 (File Wrapper Exhibit C, page 77). It was after this presentation that the Patent Office, after considering this art, the same art as was before the District Court, including the same teachings, allowed the Quick patent in suit when the distinction was clearly pointed out, as is hereto above referred to, that the difference between the Quick invention and the art lay in the Quick discovery that he was not dependent upon re-evaporation of liquid refrigerant in his holding accumulator but could operate without substantial re-evaporation of that liquid in the holding accumulator and introduce at a controlled rate the liquid refrigerant into the gaseous refrigerant and proceed therefrom whether or not there was re-evaporation or partial re-evaporation of the liquid refrigerant after leaving the trap or holding accumulator, and in this regard pointed out to the Examiner:

> "By the foregoing as discussed at this interview, it was pointed out that there may be a partial re-evaporation of the liquid refrigerant after leaving the trap before return to the compressor due to the fact that the return line is normally extended through the atmosphere at which time there will be some heat absorbed by the refrigerant which will re-

> evaporate a portion but not a substantial portion of the liquid refrigerant in the stream of gas and liquid returned to the evaporator. (File Wrapper Exhibit C, page 91, last paragraph, to page 92, line 1).

It is also evident that there was discussed before the Examiner the so-called "L" Thermobank of the Kramer-Trenton Company, which is the Thermobank system described in the patent to Nussbaum No. 2,440,146 of April 20, 1948, and the article written with reference thereto as it appeared in Commercial Refrigeration and Air Conditioning, November 1955, and which states:

> "The 'L' Thermobank incorporates a new heat source for unfailing defrost and completely eliminates any liquid slugging during defrost." (File Wrapper Exhibit C, pages 74 and 75).

Testing by the foregoing, does the art negative invention in the Quick patent within the rule laid down by our Supreme Court in *Diamond Rubber v. Consolidated Rubber Tire Company,* 220 U.S. 428, *supra*? Giving to the art the full benefit of its teaching it is obvious that without the Quick patent no one would adduce from the art that the hot gas method of defrosting could be operated without re-evaporation.

The Kettering patent does not deal with hot gas defrosting and nowhere mentions any defrosting method or manner of defrosting. It may be assumed, as this patent was apparently directed to a household refrigerator operating at above freezing temperature, that the reason is clearly found in the fact that like many refrigerators at that time of the domestic type, the operation of the refrigeration apparatus was merely discontinued and allowed to stand idle until the warm air had melted any frost that might accumulate upon the ice tray form of evaporator 12 shown in this patent. Any other con-

clusion with respect to what was intended in this patent is further amplified by the comparison of the accumulators of Figures 1 and 2 which are taught by Kettering to be equivalent and interchangeable in their function and operation in the system which he discloses. Obviously, the only way that any substantial quantity of liquid refrigerant could get out of the trap shown in Figure 2 is by evaporation due to exposure of that container 40 to the warm air. The same is true with respect to the actual disclosure of this Kettering patent which, although it does disclose a form of accumulator in Figure 1 which in a high temperature refrigeration system would admit of the return of some liquid refrigerant to the compressor, it clearly does not and did not teach this art that anything found therein is usable in a hot gas defrosting system in a commercial sub-freezing temperature installation to handle the large quantity of liquid refrigerant then produced during defrosting so that it could be returned to the compressor without substantial re-evaporation in the accumulator.

This Kettering patent issued in 1934. It is significant that all of the reviews of the art, as shown through the exhibits hereinabove analyzed, including Exhibits 6A, 6B and the articles written by Hart, Stoecker and on behalf of Kramer-Trenton, completely ignore the disclosure of this Kettering patent. The art as hereinabove demonstrated was taught that in hot gas defrost operation where large quantities of liquid refrigerant were obtained in a defrosting operation total re-evaporation was essential. As a matter of fact and of law and within the holding expressed again by our Supreme Court in *Diamond Rubber Company v. Consolidated Rubber Tire Company,* 220 U.S. 428, where it is shown conclusively that this patent had no effect whatsoever upon this art or the solution of hot gas defrosting, the patent cannot

be considered as anticipatory within the doctrine laid down by the Supreme Court in the Diamond Rubber Company case which is particularly applicable here in the quotation derived therefrom at pages 434-435:

> " . . . Many things, and the patent law abounds in illustrations, seem obvious after they have been done, and, 'in the light of the accomplished result,' it is often a matter of wonder how they so long 'eluded the search of the discoverer and set at defiance the speculations of inventive genius.' *Pearl v. Ocean Mills,* 11 Off. Gaz. 2. Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. . . . "

Although appellees' chief engineer was placed upon the stand and sought to demonstrate from this patent that the Quick invention was clearly described therein, it is significant that this same chief engineer and the author or participant in the authorship of the writings which appeared in 1945 to 1957 gave no hint to any solution to the hot gas defrosting problem other than "total re-evaporation". The effort made by Mr. Nussbaum while on the stand to read into other patents and other publications teachings or disclosures which are not therein found or to substitute this part of this disclosure of this patent for that part of that disclosure of that patent, in order to build up the teachings of the Quick patent, necessarily resulted in the change of operation and theory of operation, and is just the kind of testimony of an expert witness' elucidation of the prior art that the Supreme Court

had reference to in its 1911 decision in the *Diamond Rubber Company* case, where in the above quotation it refers to such expert witnesses and their skillful effort to revamp the actual teachings of the prior art in the light of what has been accomplished. *Mohr v. Alliance Securities Co.,* (C.A. 9, 1926), 147 F.2d 799, 800. Nussbaum's retroactive thinking is contrary to his writings. These appellants ask this Court to compare Nussbaum's written articles with his testimony given on the stand. Is it true that Kramer-Trenton and Nussbaum were suppressing their experiences or what they had learned in the art through the use of the Kramer-Trenton Thermobank system? If so, there is certainly no illustration of their teachings or uses of accumulators in any of the written articles either by Israel Kramer or by Mr. Nussbaum. What Mr. Nussbaum now says Kramer used is also not shown in the contemporaneously filed patent application. Two reasons for this may be advanced, (1) they did not work; and (2) they were concealed, suppressed, or abandoned. No one came forward to establish either knowledge of the use or that the alleged use was successful. If it were not for Quick the answer is obvious, and that is, no one would have ever heard of the alleged Kramer accumulator use. Such an alleged use cannot be considered as anticipatory within the provisions of 35 U.S.C., § 102(g) which specifically condemns abandonment, suppression, or concealment and excludes material which has been so abandoned, suppressed, or concealed from anticipatory effect of a later invention.

The Kettering patent had specifically been considered by the Patent Office Examiner at the oral interviews had prior to the grant of the Quick patent in suit. Its differentiation from the claims and from the invention of the Quick patent is quite clear. It was issued in 1934 and certainly did not teach the Quick invention which came

into being in the latter part of 1953. In the approximate twenty years intervening, it is shown to have had no effect whatsoever upon the art and upon the beliefs of the art, as those beliefs and concepts are shown by the published literature.

The Nussbaum Patent No. 2,564,310, Granted August 14, 1951, Exhibit II

This patent is directed to a means for controlling the head pressure in refrigerating systems and is really directed to what is known as the Kramer-Trenton presentation of its merchandise to the market as its "Winter Control". It is directed to a valve system and a system of bypass conduits associated with the condenser and the receiver through the medium of which there is maintained in accordance with existing temperature conditions, restricted flow of refrigerant from the compressor 1 to the liquid refrigerant receiver 5 in accordance with conditions existing within the condenser 3. It does deal with a hot gas defrost operation as it indicates in the modification of Figures 4 and 5 a bypass line 31 for bypassing hot gas from the compressor to bypass the condenser 3, receiver 5, and expansion valve 7 for the purpose of defrosting the evaporator 9. It recognizes again the problem existing in this art of slugging the compressor and shows in the suction line a container or accumulator 35 having a bottom inlet and a top outlet which would thereby form a trap to hold liquid refrigeration from flowing to the compressor 1 during the defrosting operation. It is this trap that the Hart article, Exhibit Q, warns against in stating "should not be trapped for a trap in the suction line would quite likely produce a slug", etc.

There is no indication in this patent of any structure used or suggested by Nussbaum other than this simple

trap containing a bottom inlet and a top outlet as is evident from both Figures 4 and 5 of the drawings of the Nussbaum patent. The only description of this holding accumulator is contained in column 6, lines 30 to 60, inclusive, wherein the particular function is described and in which it is particularly pertinent to note that Nussbaum describes that the liquid refrigerant which enters the tank 35 is to be vaporized therein before it is allowed to pass out of the tank 35. This again is what Hart states in Exhibit Q. Thus, Nussbaum states:

> ". . . This is accomplished by causing liquid to enter the lower part of the accumulator tank 35 and be vaporized therein before it is withdrawn therefrom by suction to the compressor. This vaporization will take place within the tank because refrigerant fluid is normally volatile, and such vaporization will be accelerated if any source of warmth, such, for instance, as sunlight, acts upon the accumulator." (Nussbaum Patent 2,453,310, column 6, lines 53-61).

Review of the remainder of the specification for any further description of the mode of operation and purpose of the accumulator tank will show a similar teaching by Nussbaum in column 7, lines 19 to 23, which reiterates the teaching that the liquid refrigerant is only withdrawn from the accumulator as a gas. The statement is:

> ". . . The defrost step condenses this gas which flows as a liquid to accumulator 35, is there vaporized, and then drawn into the compressor in the form of gas during continued operation of the system."

The teaching of Nussbaum as to the operation of the accumulator tank 35 is therefore that the liquid refrigerant is drawn into the tank during the defrosting operation and therein, i.e., in the trap, is completely vapor-

ized before it is allowed to return to the compressor. In fact, in the absence of a metering tube not shown by Nussbaum, no other operation could take place because there is a gap between the bottom inlet and top outlet of the accumulator 35 and unless the tank 35 was flooded to overflowing only gas could leave this tank 35. The disclosure of this patent cannot as a matter of law be amplified by its inventor as is here sought to be done to include therein something which is not there shown and which is in fact directly contrary to the plain words and meaning of the disclosure of the patent. *Carson v. American Smelting & Refining Co.* (C.A. 9, 1925), 4 F.2d 463; and *Pursche v. Atlas Scraper and Engineering Co.* (C.A. 9, 1962), 300 F.2d 467. This patent was, as has heretofore been shown, considered by the Patent Office Examiner, and the portions of the specification hereinabove quoted in detail were made known to the Examiner. This patent does not disclose the mode of operation involving the Quick concept of separating the gaseous refrigerant from the liquid refrigerant during defrosting operation and then feeding the liquid back into the gaseous refrigerant at a controlled rate without substantial volatilization of the liquid refrigerant in the accumulator, the heart of the Quick invention, and cannot now be reconstructed to make it include something which is not clearly defined therein. The reason for this is obvious in that it would not so teach any one skilled in the art that it had solved the problem or that it had the mode of operation or method of the Quick invention. This Nussbaum patent is not ambiguous, its teaching is clear, and the law is well established that its teachings are from its own words and drawing, not from something ingrafted thereon by a skillful expert.

It is fundamental in this regard that if Kramer-Trenton or Nussbaum at any time ever employed an

accumulator tank in its system as an adjunct to the Thermobank system at a time prior to the filing date of this Nussbaum patent, the failure to illustrate the same in Figures 6 and 7 of this patent is conclusive evidence that the accumulator used was like the accumulator tank 35 of Figures 4 and 5 of this patent and had the same operation, that is, of holding the liquid refrigerant until it evaporated or was "boiled off". In Figures 6 and 7 there is defined in the same manner as the Thermobank operation of a patent No. 2,440,146 referred to in column 7, and there is the same teaching as heretofore pointed out with respect to the other modifications of this invention where hot gas defrosting is indicated, and that is:

> ". . . The heat of the tank vaporizes the fluid so that it may be drawn as a gas through pipe 55 to the intake of the compressor." (Column 8, lines 32-35).

It is alleged that at this time and at the time of the filing of this application Kramer-Trenton had utilized as an emergency measure a different form of accumulator tank as shown in the drawings of this patent No. 2,564,310, and it is alleged that where difficulties were encountered in the use of the Thermobank system because of inadequate capacity to handle the liquid refrigerant during defrost such accumulators were added to the system to hold the liquid refrigerant which might splash over from the Thermobank system and these accumulator tanks acted as a means of protecting the compressor from slugging. It is alleged that such accumulator tanks are shown, for example, in the drawing, Exhibit F, dated September 7, 1945, and that certain installations were made using such accumulator tanks. It is alleged that the surge tank illustrated in this drawing Exhibit F is of the form shown in the Kramer-Trenton drawing dated June 9, 1947, Exhibit G, and that such

surge tank had an oil return line in its bottom portion when installed in the refrigeration system in the manner as illustrated in the drawing, Exhibit J, dated April 11, 1947, and that that oil line would permit some quantity unspecified of liquid refrigerant to flow out of the surge tank to reach *the suction line* and be completely vaporized in the suction line before it returned to the compressor. It is submitted that this combination, if it ever existed, does not meet or suggest the invention of the Quick patent in suit because it is still primarily dependent upon the volatilization of the greater portion of the liquid refrigerant in the surge tank, and certainly if any such system existed it did not teach the art, nor even Kramer-Trenton Company, that a hot gas defrost system could be operated which was not dependent upon re-evaporation of the liquid refrigerant before that refrigerant was permitted to return to the compressor. It is further submitted in this regard, however, that there is no adequate proof that any such system as illustrated by the foregoing exhibits ever existed or was used within the requirements of proof laid down in the Barbed Wire Patent Case, 143 U.S. 275, 36 L.ed. 154. The character of proof offered in this case as to the existence of any such system by Kramer-Trenton Company is of the precise character condemned by the Supreme Court in the Barbed Wire Case. The proof proffered of this alleged use totally lacks corroboration and is dependent from the testimony of Otto J. Nussbaum alone. The alleged use is contrary to the disclosure made by Nussbaum in, for example, the Nussbaum patent No. 2,564,310, Exhibit II, which was filed at a time contemporaneous to the alleged use. It is also contrary to the spirit of the requirement of the patent law in that if in fact any such use did exist it was abandoned, suppressed, and there is no disclosure thereof to any one outside of the Kramer-Trenton Company. If there was such a disclosure the record totally

lacks evidence thereof. No user or alleged user of such a system was called to corroborate its existence. The patents which were filed on behalf of the Kramer-Trenton Company carefully avoid mention thereof so that it is evident that the proof is insufficient within the Barbed Wire Case and in fact is susceptible of condemnation within the provisions of 35 U.S.C., § 102(g) as having been abandoned, suppressed, or concealed. Such fact of abandonment, suppression or concealment is best tested by the fact that if the Quick invention had not been made available to the public through the efforts of Quick and appellant Recold and by the public demonstrations thereof made, for example, to Kramer-Trenton Company and Nussbaum through the demonstration of the demonstrator of Exhibit 15 so that Kramer-Trenton was able to copy the system developed by Quick and Recold, the public would never have learned, as far as the evidence before this Court is concerned, of the alleged use of the system as allegedly made, including the instrumentalities illustrated in Exhibits F, G and J. No person other than Nussbaum testified before this Court as to the existence of any such system and he clearly failed to include any such system within the disclosures of any of the patent applications which he filed subsequent to the alleged use. This is a simple case falling within the condemnation of this type of evidence by the Supreme Court as set forth in the Barbed Wire case, 143 U.S. 284, 285. There is another positive statement included in the published statements of the Kramer-Trenton Company that belies the purported operation alleged to have been performed by the use of the elements as combined in the above identified drawings and which is dependent upon the use of an oil return line as a means of returning some liquid refrigerant to the suction line and that is as found in the disclosure made in the article prepared by Israel Kramer and which the witness Nussbaum testified he

participated in, i.e., the statement made by Israel Kramer that the oil return line is sized so that in its position of use in the Thermobank system that liquid refrigerant will not and does not pass therethrough into the suction line. Thus, Mr. Kramer, President of Kramer-Trenton Company, and who incidentally was not called as a witness by appellees, although available to be called, states in his article, Exhibit 6A, on the 6th page thereof, last paragraph:

> " . . . At the bottom of the inner tank there is also provided an oil drain connected to the oil sump of the compressor, to return whatever oil is deposited by the refrigerant going through the inner tank. This line is small in diameter, just sufficient to permit the return of oil without allowing liquid refrigerant to drain into the compressor suction."

Thus, in Figure 12 upon this page 6 of the article, Exhibit 6A, the oil return line is shown at 6 coming from the bottom of the tank and corresponds to the line of Exhibit F shown at 6 coming from the bottom of the inner tank and labeled oil return and where there is shown a similar line connected into this oil return from the surge tank.

Again, if we take the teaching of this purported evidence alleged to anticipate or negative the invention of the Quick patent, and analyze its entire teaching to the art, we must come to the same conclusion as was made evident to the Patent Office during the prosecution of the Quick application, that the art was convinced prior to the Quick invention that a system to operate must so operate that it will, as stated by Mr. Kramer in Exhibit 6A, page 5, thereof:

> " . . . In order to achieve a completely automatic defrosting system with hot gas, a supply of heat must be instantly available for defrosting under all

conditions of operation in order to re-evaporate the condensed refrigerant before it enters the suction valve of the compressor."

If such teachings were casual and isolated they might possibly be subject to explanation but where they permeate each and every article written by, publication of and patent application or patent granted to the Kramer-Trenton Company they cannot be explained away as in the manner sought by the witness Nussbaum. The testimony thus given is amply illustrated in the Barbed Wire Case as the testimony of an interested witness prodded into activity by the necessity of the case in question, and where there is total lack of corroboration were available, it cannot be accepted as proof of the guantum or character required to establish the fact of any use, teaching or knowledge:

> " . . . have required that the proof shall be clear, satisfactory, and beyond a reasonable doubt . . . " *Barbed Wire Patent* 143 U.S. 275, 284.

The Marshall Patent No. 1,594,422, Granted August 3, 1926

This patent to Marshall granted in 1926 on an application filed December 4, 1924, discloses a "small scale trap" shown in Figure 1 at 7 in the suction line. It teaches that the use of such a small scale trap in the suction line was old and had been used prior to Marshall's purported invention and states precisely its purpose:

> " . . . Ordinarily, the small scale trap that is interposed in the return line from the expansion coils is sufficient to intercept such slugs of liquid and hold them until they re-evaporate . . . " (column 1, lines 7-10).

This is the same as taught by Hart, Exhibit Q, 27 years later. The patent is purportedly directed to the imposition in the suction line, as shown in Figure 1, of a choke diaphragm 8 the purpose of which is to impede the flow in the suction line to insure such re-evaporation and to the use of a scale mechanism shown in Figure 2 which will weigh the system so that as the quantity of liquid approaches the danger point such that some of it might be returned to the compressor, the operation of the compressor will be discontinued by shutting off the motor driving the same until sufficient of the liquid refrigerant is returned to a tank 11 under the influence of a pump 13 and is then returned to the receiver so that it cannot reach the compressor 4. The teaching of this patent is of a system of draining, scale, and switch mechanism operated by the scale to insure there is no possibility of liquid refrigerant flowing into the suction line 3 to the compressor 4. The liquid refrigerant is returned to the receiver, bypassing the compressor. The liquid refrigerant in the patent is not metered into the gaseous refrigerant and the gas returned to the compressor.

The Marshall patent does not disclose the Quick invention but teaches exactly what was represented to the Patent Office with respect to the prior art and knowledge thereof that all effort must be made to insure complete re-evaporation of or withdrawal of liquid refrigerant from the system so that no liquid refrigerant could reach the compressor. The patent does not deal with nor disclose any means for defrosting and certainly does not teach the art that in the use of the hot gas defrost system the liquid refrigerant could be metered back into the gas flowing through the suction line without substantial re-evaporation and thus as it is dispersed in the gas be handled by the compressor without liability of damage to the compressor. It does teach the necessity of the

re-evaporation of the liquid refrigerant or the withdrawal of the liquid refrigerant while stopping the compressor, page 1, column 1, lines 24 to 28. There is no accumulator operating through the medium of a metering tube to return liquid refrigerant to the gas in the suction line.

The Pabst Patent No. 2,589,855,
Granted March 18, 1952

This patent was thoroughly considered by the Patent Office Examiner before allowance of the claims to Quick as shown in the file wrapper Exhibit C. The manner in which this patent fails as a disclosure of the Quick invention was particularly pointed out to the Examiner in the manner set forth on pages 90-91 of the file wrapper. There are two Pabst patents, both of which were considered at this interview, as is stated on page 91 of the file wrapper:

> ". . . It was further pointed out at this interview that the Pabst patent, 2,589,855 is stated to be a modification of the disclosure of the Pabst patent, 2,525,560 only in the manner of picking up the refrigerant in the refrigerant receiver before it is passed through the element 7 which, as previously stated, is then operated as an evaporator as compared with the method of picking up the refrigerant from the receiver as disclosed in the prior Pabst patent, 2,525,560.

There is no accumulator provided with a metering tube. There is no flow of liquid refrigerant to the compressor with the refrigerant gas. In accordance with this Pabst patent the refrigerant coming from the evaporator normally passes through the line 4 into the liquid refrigerant receiver 10 located below the condenser 7. That there can be no flow of refrigerant through the pipe 4 back into

the condenser 7 to the compressor is obvious. The very function of the condenser 7 is to condense gaseous refrigerant to liquid refrigerant which is then deposited in the receiver 10. The only purpose of the brake between the tube 9 and the line 4b is to equalize the pressure in the system and as stated by Pabst in his patent as such pressure is relieved there will be little or no back pressure on the flow of the refrigerant which could possibly account for the flow of liquid refrigerant back through the condenser 7 to the intake of the compressor 12. Thus, Pabst states:

> ". . . As the pressure of the air in the receiver or reservoir is thus relieved, little or no back pressure on the flow of the refrigerant from the evaporator to the receiver will retard such flow." (Column 3, lines 3-6).

It is significant to note that at all times the claim of invention presented to the Patent Office Examiner and accepted by the Patent Office Examiner in the granting of the Quick patent was as stated in the final amendment presented to the Examiner just prior to allowance in which, on page 90, it is stated:

> "It was urged by counsel at this interview that there was no reference of record which taught the art that hot gas defrosting could be accomplished without re-evaporation of the refrigerant which was condensed in the evaporator during defrosting operation. . . ." (File Wrapper Page 90).

This is what the Examiner and the Patent Office accepted as the invention of the Quick patent and as defined in the claims before this Court. The claim made to the Examiner by counsel to obtain the allowance of this patent is the same claim and same position taken by counsel before this Court and as here demonstrated.

The British Patent No. 554,807 to The British Thomson-Houston Company, Limited, of July 20, 1943

This British patent in accordance with the law must be construed only as to what is clearly and positively disclosed therein, and not by what might be made out of it. This rule is stated by the leading case of *Carson v. American Smelting* (C.A. 9, 1925), 4 F.2d 463 and was recently applied by this Court in *Pursche v. Atlas Scraper and Engineering Co.*, (C.A. 9, 1962), 300 F.2d 467. In reversing the District Court this Court stated in the *Carson* case:

> "A foreign patent is to be measured as anticipatory, not by what might have been made out of it, but by what is clearly and definitely expressed in it. An American patent is not anticipated by a prior foreign patent, unless the latter exhibits the invention in such full, clear, and exact terms as to enable any person skilled in the art to practice it without the necessity of making experiments. (Citing cases) In Westinghouse Airbrake Co. v. Great Northern Ry. Co., 88 F. 258, 31 C.C.A. 525, the court said: 'The prophetical suggestions in English patents of what can be done, when no one has ever tested by actual and hard experience and under the stress of competition the truth of these suggestions, or the practical difficulties in the way of their accomplishment, or even whether the suggestions are feasible, do not carry conviction of the truth of these frequent and vague statements.'" (Page 465)

This British patent relates to a system for maintaining a supply of liquid refrigerant in the evaporator so that the evaporator will not be starved at a period of time after stopping the compressor for any reason, and pro-

vides for the positive prevention of the flow of liquid refrigerant into the suction line. This patent discloses no consideration of the problem of dealing with liquid refrigerant during a defrosting operation. It does not show nor describe hot gas defrosting and the reason for this is obvious. The patent is dealing with small refrigeration operations of the household refrigerator type which is operating above freezing temperature. The whole purpose of the apparatus is to make available a supply of liquid refrigerant in a holding tank for evaporation in the evaporator so that the refrigeration operation is not delayed after stopping of the compressor for any reason on the restarting of the operation. The purpose of the arrangement as shown in this British patent is as stated on page 3, first column, lines 17 to 24:

> ". . . In order to provide refrigeration throughout the conduit 23 when operation of the compressor is resumed, we construct the header 24 so that it acts as a liquid trap during the 'off' period of the cycle and so that it supplies liquid refrigerant to the conduit 23 as soon as the compressor is started.'

The conduit 23 is the refrigerant circulation pipe or conduit of the evaporator. The purpose of the header 24 is to store liquid refrigerant so that it is at all times available for re-evaporation into the conduit 23. The purpose of the element 25 as shown in Figure 4 is also described and it is here stated that the primary purpose of this structure is to insure return of oil separated from the refrigerant to the suction line so that it may be returned to the compressor while the container 25 being in heat exchange relationship the liquid refrigerant separated in the tank 25 will be evaporated, leaving the oil to be carried with the vaporized refrigerant to the compressor, as is described in this British patent, column 3, beginning

at line 84 and continuing through to line 2 of the first column of page 4.

The use of heat as a medium of preventing liquid refrigerant from leaving the tank 25 is described in this portion of the British patent as follows:

> ". . . This separation is accomplished in the heat exchanger 16, 18 since the liquid mixture will absorb heat from the hot liquid in the capillary tube 18, which is in heat exchange with the suction line 16, and the liquid refrigerant will thereby be vaporized leaving the oil which is carried with the vaporized refrigerant to the compressor."

This patent does not even mention the problem sought to be solved by the patentee Quick, let alone disclose a solution thereto. As it is neither concerned with nor discloses a solution of the Quick problem, it is clearly not anticipatory nor is it effective as showing lack of invention and it cannot be used by modification or alteration or change or addition in support of a claim of obviousness as is evident from the rules with respect to construction of foreign patents as stated in the *Carson* case, *supra.*

The Hart Publications of February 1951 and March 1951, Exhibits P and Q

The Hart publications were clearly before the Patent Office and Exhibit Q, the second portion of the continuing article, is clearly cited by the Patent Office and was discussed at the interviews had with the Patent Office Examiner, and referred to in the file wrapper Exhibit C, page 75, the substance of which is contained in the Brief on Appeal filed on behalf of Lester K. Quick. In this brief it is stated:

> "The teachings of this art with respect to the use of the hot gas system of defrosting are exemplified very well in the articles appearing in the March 1951 issue of 'Refrigeration Engineering' entitled 'Hot Gas Defrosting In Commercial Refrigeration' and 'Part II — Practical Aspects Of Operation' by Thomas H. Hart, Chief Engineer of The Warren Co., Inc., Atlanta, Georgia."

The Hart article, Exhibit P, is a discussion of the use of the hot gas system of defrosting in small refrigeration operations, apparently open-top refrigeration showcases as shown in Figure 1 which are above freezing operations. It demonstrates that there is no problem in such small operations with the use of hot gas defrost because of the minimal amount of heat required to effect defrostings in such operations with the result that the amount of liquid refrigerant produced during defrosting will be about the same as if the hot compressed refrigerant were directed to the evaporator instead of to the condenser, stating:

> " . . . Conversely, the compressor would have to operate about that same length of time to defrost the evaporator if the hot compressed refrigerant were diverted to the evaporator instead of to a condenser." (Exhibit P, page 140, 2nd column last sentence of the 4th paragraph).

This article does not suggest in any way the Quick invention and nowhere discloses the use of an accumulator trap with a metering tube or the method of operation in which the liquid refrigerant is held and then metered at a controlled rate back into the gaseous refrigerant so that the compressor is able to handle the mixture of liquid and gaseous refrigerant without damage to the compressor. No suggestion of this operation is made or

even hinted at. In fact, the entire thesis of Exhibit P is an attempt to refute the experience of the art that simple hot gas defrosting could not be used without danger to the compressor, and seeks to demonstrate where, under certain precise conditions of low refrigeration requirement, the hot gas defrost system has been used.

The Hart article, Exhibit Q, i.e., the March 1951 conclusion of Hart's presentation of hot gas defrosting is specific in its teaching that in the use of the hot gas defrosting system no trap should be used in the suction line, stating upon page 246:

> " . . . Second, the suction line within the refrigerated space should not be trapped for a trap in the suction line would quite likely produce a slug which would have to be evaporated before it reached the suction inlet of the compressor."

This article teaches that where any trap is used in the closed cycle of refrigeration it must be so used that the liquid refrigerant is boiled off in the trap, preventing any introduction into the suction line of liquid refrigerant, stating:

> " . . . The function of this device is to trap any slugs of liquid before they reach the compressor, regardless of the rate at which hot gas is metered into the evaporator, and retain this refrigerant until it has 'boiled off' from the combined action of the suction and the heat pick up through the wall of the device. . . . " (Exhibit Q, page 248, 2nd column, 3rd paragraph).

Again, it must be observed that Hart's entire consideration of a hot gas defrost system is predicated upon small refrigeration installations and this is clearly made apparent in his article upon page 248 where he states:

> "Bear in mind that this article is being written about small, if not fractional, horsepower machines and the equipment is based on this type of installation. . . . "

In considering larger installations Mr. Hart in his article on page 249 thereof states the then known use of two systems employing hot gas defrost which are in reality the Thermobank system as defined in the second paragraph on page 249 as follows:

> "The better known of the two is essentially a heat exchanger and accumulator enclosed within a brine tank and installed in the compressor discharge line between the compressor and the condenser. Diagram of such a system is shown in Figure 10. . . . "

The second known system of use in larger installations is where an electric heater is used to supplement the heat of the compressed gas as defined in the next to last paragraph of the first column upon page 249. And as pointed out to the Examiner during the prosecution of the Quick application no teaching can be gathered from the Hart articles other than that the simple system of hot gas defrost can be used in very small refrigeration installations where the heat required to defrost is relatable to the heat required for compression of the refrigerant during normal refrigeration operations and that where larger installations are employed using this system there must be some heat exchange system used to provide for re-evaporation of the liquid refrigerant produced during defrosting. Here the articles of Hart have two disclosures with respect to such operations, one of which is the use of the Thermobank hot brine system and the other is the use of an electric heater also for the purpose of heating brine to provide for complete re-evaporation of the liquid refrigerant. In Exhibit P the proof that this article

actually refers only to above freezing operations in the small installations referred to comes from the disclosure of the article that the operation of hot gas defrost is used merely for the purpose of knocking the frost off from the evaporator surface where it is allowed to fall in the pan. Thus Hart states on page 140 of Exhibit P:

> " . . . By thus breaking the bond from the inside with heat, it is possible to 'knock off the frost' without taking the time or energy to melt all of it completely." (column 2)

This operation can be performed in an above freezing operation where, after the frost is knocked off the evaporator, it falls into the refrigerant space into a container where it will subsequently melt because the air is at a temperature above the freezing point of water. In a below freezing operation it obviously could not be performed because the effect thereof would be to accumulate the ice, and the air being below freezing temperature, it would not melt and would soon operate to clog the entire system. This is one of the things learned from the operation of the water defrost system where great care had to be employed to drain all the frost out of the refrigerated space on each defrosting or the result would be the icing up of the entire system. Again, there is no assertion in this Hart article that the article discloses the Quick invention. On the contrary, the argument is made that by taking the disclosure of Hart that hot gas defrosting was possible and changing what is suggested in it for that which is derived from the asserted Kramer-Trenton 1945 use of an accumulator trap, a system would come into being which approximates the disclosure of the Quick patent. It is submitted that this method of building up an anticipation is only usable where it is possible to show that the art directed the interchange of the elements of the several disclosures

and there is clearly no such direction which can be pointed to in any of the publications or patents before this Court. In fact, there is no disclosure before this Court that the art, except that in hot gas defrosting systems the liquid refrigerant produced on the defrosting operation must be and is completely evaporated before it is admitted to the suction line. It remained for Quick to teach the contrary and to teach that the liquid refrigerant could be metered into the returning gaseous refrigerant and that the compressor could handle the mixture without liability of damage to the compressor. This is the system covered in the Quick patent in suit and it is not found in any of the art before this Court.

Having demonstrated from the prior art where that art failed, and how Quick by his invention solved the problem of the art which existed from 1888, we submit this Court should follow the direction of the Supreme Court in *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 at 63:

> " . . . If it has done so, then the court is liberal in its construction of the patent, to secure to the inventor the reward he deserves. . . . "

The Thaw System of Operation

The defense of this action was predicated upon the thesis and theory that the Thaw system acted to completely re-evaporate the liquid refrigerant, and that therefore the Thaw system followed the teaching of the prior art of complete re-evaporation of liquid refrigerant before it reached the compressor. This theory of the defense was completely exploded at the trial through the use of simple arithmetic where it was demonstrated that the liquid refrigerant produced during the operation of the Thaw system was such that if the metering ac-

cumulator of the Thaw was not used, such quantities of liquid refrigerant would be returned to the compressor as would completely disrupt the compressor. This fact was admitted by Mr. Nussbaum after plaintiffs' witness, Mr. Wile, taking the figures supplied by Mr. Nussbaum, established the quantity of liquid refrigerant produced during a defrosting operation if allowed to return to the compressor as slugs would have destroyed the compressor. And in these calculations it was determined that during a defrosting operation the quantity of liquid refrigerant produced would be 54 pounds. It was established and admitted by Mr. Nussbaum that if the metering accumulator in the Thaw system were not present that this quantity of refrigerant would arrive at the compressor in the form of slugs:

> "Q Now, if that wasn't metered into the suction line in small quantities it could come in there in slugs, couldn't it?
>
> A If it did not have a metering accumulator and a holdback valve the refrigerant would be likely to arrive in the form of slugs, yes." (Tr. Vol. 13, page 1558, lines 8-13).

Plaintiffs' witness Mr. Wile established on page 1562 that in the operation of the Thaw system if it was not for the operation of the metering tube the quantity of liquid would be such that 41 pounds of refrigerant reached the compressor in the form of slugs during a 27 minute period of operation and that this quantity of refrigerant as a liquid would pass into the compressor, stating:

> "Q Leaving the difference between 13 and 54 pounds?
>
> A 41 pounds of refrigerant that would reach the compressor during the 27 minutes.

Q And that would reach it in a dispersed form due to the metering tube operation, would it not?

A It would.

Q And if that was an open type compressor it would pass into the compressor — into the compressor, wouldn't it?

A Well, yes."

(Tr. Vol. 13, page 1562, lines 2-11).

Contrary to the belief or thesis upon which this case was tried, that is, of total re-evaporation before the refrigerant could reach the compressor in the Thaw operation, Mr. Nussbaum admitted that the liquid refrigerant would reach the compressor in unevaporated form, stating:

"Q Now, isn't it a fact, Mr. Nussbaum, that this calculation proves that refrigerant would reach the compressor in liquid form?

A If we have only a 20-foot suction line then it would reach the entrance to the motor compressor partially unevaporated, and it would proceed to evaporate as it passes through the suction passages of the compressor and through the motor windings of the compressor.

Q Is the Thaw system only useful with a hermetic type compressor?

A No, it is not."

(Tr. Vol. 13, page 1560, lines 4-14).

The explanation of the last portion of this examination is that Mr. Nussbaum in the latter part of his answer above quoted endeavored to state that in a hermetic type

compressor it is possible that the same liquid refrigerant might be evaporated in the suction passages of the compressor and when passing through the motor windings of the compressor, a system which is not feasible or possible in anything but a hermetic type compressor, and in this respect Mr. Nussbaum was forced to admit that when the Thaw system is used in a system other than where there is a hermetic type compressor the amount of liquid which reached the compressor as dispersed in the gas is as disclosed by Quick in his patent and that it is due to the dispersal of the liquid refrigerant in a gaseous refrigerant which permits the Thaw system under such condition to operate. There is no other conclusion. This portion of this argument is not here presented for the purpose of demonstrating the fact of infringement which was not ruled upon by the District Court although there was presented to the District Court findings of fact which would have no infringement and these findings were rejected by the District Court as is shown by the record here. This factual demonstration of infringement is presented to show that the defendants herein, in predicating their theory of defense upon the theory of total re-evaporation, have in effect admitted the fact that the teaching of all of the art prior to the Quick invention was upon the theory of total re-evaporation of the liquid refrigerant and that the Kramer-Trenton Company before the District Court sought to bring the Thaw operation within the teachings of the prior art, that is, of total re-evaporation and that it was finally shown to the District Court that the Thaw system in fact did not operate upon the theory of the defense, that is, of total re-evaporation.

There was no departure from and no misrepresentation made in the prosecution of the application before the Patent Office (Findings 25 and 27)

This Court did not find nor does the evidence support a finding that there was any misrepresentation made to the Patent Office which was in any way material to, relied upon, or instrumental in obtaining the allowance of the application before the Patent Office. The establishment of such facts is an essential to this defense and as this is a defense in the nature of fraud, it is obvious that the burden is upon the person asserting such fraud to establish the same, and the burden is very heavy in this regard. *Edward Valves, Inc. v. Cameron Iron Works, Inc.,* (C.A. 5, 1961), 286 F.2d 933, 947. This case establishes, among other things:

> ". . . The file wrapper of the Allen patent shows that the withdrawal of the Brown patent played no part in the subsequent allowance of the Allen patent. A false statement does not destroy the presumption of validity of a patent unless the statement was 'essentially material' to its issuance. . . ."

and further establishes the law that:

> ". . . The appellants have a heavy burden in alleging fraud. See Metal Extrusions, Inc., D.C. Fla. 1956, 145 F.Supp. 51 affirmed Porterfield v. Gerstel, 5 Cir., 1957, 249 F.2d 634; Becton Dickinson & Co. v. R. P. Scherer Corp., 6 Cir. 1954, 211 F.2d 835. . . ."

In this case it is clear that from a consideration of this entire matter as presented on behalf of Quick to the Patent Office, Quick sought a solution to a single problem and that problem was the handling of liquid refrigerant as produced during defrosting and which, unless inhibited, would return to the compressor in such manner

as to damage the compressor and stop the refrigeration operation. It is clear throughout the series of three applications that what Quick invented is carried over throughout the three applications. There was no change in the application which was material to the allowance of the claims as ultimately allowed by the Patent Office. The only possible claim that could be made contrary to the foregoing is to assert that Quick did not understand the operation of his invention or did not understand the theory on which it was operating.

The theory of his operation of how his solution to the problem actually performed its operation in solving the problem is not to be considered in any way as a requisite to the validity of the Quick patent. It is immaterial to the consideration of the validity of the patent whether or not the patent contains an erroneous explanation of its principles or manner of operation. *Petroleum Rectifying Co. v. Reward Oil Co.* (C.A. 9, 1919), 260 F. 177, 181; *Aetna Stub Products Corp. v. Southwest Products Co.* (C.A. 9, 1960), 282 F.2d 323, 334; and *Diamond Rubber v. Consolidated Rubber Tire Company,* 220 U.S. 428, *supra.*

In the attack made by Finding 17 upon the presentation of a Hart article to the Patent Office to show that the Hart article taught re-evaporation and to avoid the use of a trap or accumulator in the suction line or that a refrigerant must be re-evaporated therefrom, it is only necessary to read the Hart articles and the specific quotations made therefrom as, for example, here specifically set forth and quoted from these articles under the heading "The Hart Publications of February 1951 and March 1951, Exhibits P and Q", wherein it is shown that Hart teaches in Exhibit Q that no trap should be used in the suction line as such use would be likely to produce a slug which would have to be evaporated, and who also

teaches that where an accumulator or a trap is so used such trap or accumulator would have to retain the refrigerant "until it is 'boiled off' ". These are the facts which are material to the presentation of this matter to the Patent Office on behalf of applicant Quick and is the distinction which was made and it is immaterial whether an error was made with reference to the use of some other adjunct in the system which is not material to the question of re-evaporation or operation of the system when in defrost. There is no showing in any way that this error had any effect whatsoever upon the examination and in fact it could not have had. The real premise of the presentation of this matter to the Patent Office was that the article taught the avoidance of trapping a liquid in the suction line or taught that if such trap or accumulator were used it would have to hold the liquid refrigerant until it was completely "boiled off". Innocent misrepresentations which are not shown to have any effect upon the issuance of the patent do not destroy the presumption of validity, nor do they in any way affect the enforcement of the patent issued.

In addition to the cases herein set forth establishing this fact, see *Martin v. Ford Alexander Corporation,* 160 Fed. Supp. 670, U.S.D.C.S.D.Cal. 1958), and *McCulloch Motors Corporation v. Oregon Saw Chain Corp.,* 147 USPQ, 175, D.C. S.D. Cal. 1965.

CONCLUSION

It is therefore respectfully submitted that the District Court erred in holding that the Quick patent was invalid or that it did not require the use of invention to perceive the Quick method of operation which deviated completely from the teaching of the prior art and brought into operation a system utilizing the very ancient and known universally usable system of hot gas defrost which, as the record shows, was accepted by the art on a very large scale upon its introduction and that the fact that there was invention in this system is further amplified and proved by the fact of literal copying of the Quick invention by Kramer-Trenton Company within the doctrine laid down by this Court in *The Filtex Corporation v. Atiyeh* (C.A. 9, 1954), 216 F.2d 443, 445, and *Troy v. Products Research* (C.A. 9, 1964), 339 F.2d 364, 366.

Respectfully submitted,

LYON & LYON

By

Lewis E. Lyon

Attorneys for Appellants

CERTIFICATE

I certify that in connection with the preparation of this Brief I have examined Rules 18 and 19 of the United States Court of Appeals for the 9th Circuit and in my opinion the foregoing Brief is in full compliance with those rules.

LEWIS E. LYON

APPENDIX

Document	Plaintiffs' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
U.S. Patent No. 2,953,906, Lester K. Quick, dated Sept. 27, 1960, for Refrigerant Flow Control Apparatus	1	5	6
File Wrapper of U.S. Patent Application Ser. No. 396,115, Lestor K. Quick, for Accumulator Trap For Refrigerating Systems	2	96	196
File Wrapper of U.S. Patent Application Ser. No. 436,784, Lester K. Quick, for Refrigerating Apparatus	3	96	196
Agreement between Lester K. Quick and H. W. Jarvis, dated May 20, 1955	4	36	43
Agreement between H. W. Jarvis and refrigeration Engineering, Inc. dated Sept. 1, 1955	5	36	41
Supplemental Agreement between Lester K. Quick and H. W. Jarvis, dated Sept. 1955	5A	36	43
Certificate of Amendment of Articles of Incorporation of Refrigeration Engineering, Inc. Change of Name to Recold Corporation	5B	36	40
Article by Israel Kramer, "The 'Thermobank' System"	6A	96	391
Article by Otto J. Nussbaum, Automatic Defrost Utilizing A Latent Heat Source	6B	96	
Article by Otto J. Nussbaum, "The Thermobank Simplified"	6C	96	408
Brochure—"Kramer presents a new kind of Thermobank"	6D	96	908
Sketch showing Defrost Operation	6D-1	927	930
Bulletin — "Installation Instructions for Kramer Thaw System"	6E	96	450

Document	Plaintiffs' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
U.S. Patent No. 2,718,764, I. Kramer, dated Sept. 27, 1955, for Refrigerating System With Hot Gas Defrosting Means	6P	96	946
Memos from David A. Nurse, (Kramer-Trenton Company) to Kold Kist, Atten. Mr. Linden, dated 7/12/61 and 6/9/61	7	96	534
Kramer Bulletins	7-A	96	534
Bulletin—List Prices Kramer Thaw System	8	96	534
Bulletin — Kramer Thaw System — "A New Automatic Hot Gas Defrost System"	9	96	450
Photographs of demonstration models	10-A to 10-H	96	468
Kramer Thermobank System, Exhibit A to affidavit of Daniel D. Wile, filed herein Feb. 15, 1962	11	96	468
Article by R. H. Luscombe, "Methods of Defrosting Commercial Refrigerating Equipment" (See Wile Affidavit, Def. Exh. MM, Volume 4, Defendants' Book of Exhibits)	12	233	753
"Recold Hot Gas Installations", graphs, interoffice communications, memoranda, charts, etc.	13	96	484
Photographs of test operations at Recold and submitted to Examiner at Patent Office interview	14-A to 14-E	96	472
Physical Exhibit	15	96	404
Diagrammatic Drawing entitled "A Refrigerant is any volatile Liquid"	16	96	404
Diagrammatic Drawing entitled "Refrigerant Boiling at Low Temperature"	17	96	404

Document	Plaintiffs' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
Diagrammatic Drawing entitled "Evaporating and Condensing Temperature of Freon 12 at Various Pressures"	18	96	404
Diagrammatic Drawing entitled "Refrigerant Evaporator"	19	96	404
Diagrammatic Drawing entitled "Steam Condenses When Heat is Removed"	20	96	404
Diagrammatic Drawing entitled "Basic Refrigeration System"	21	96	404
Diagrammatic Drawing entitled "Superheat Defrost System"	23	96	404
Diagrammatic Drawing entitled "Kramer Thaw System"	26	96	450
Physical Exhibit	29	96	404
Supplemental Agreement between H. W. Jarvis and Lester K. Quick, dated Sept. 27, 1960	30		43
Supplemental Agreement between H. W. Jarvis and Lester K. Quick, dated Sept. 27, 1960	30-A		43
Supplemental Agreement between H. W. Jarvis and Recold Corporation, dated Sept. 27, 1960	31		43
Article by W. F. Stoecker entitled "Ammonia Liquid-Return Systems", from Industrial Refrigeration, Dec. 1955	32	96	411
Inter-Office Correspondence between D. D. Wile and H. A. Halls re Kramer "Thaw" Defrost System	33	146	153
Chart—Safeway Store 652, 35201 Newark Blvd., Newark, California, 6/28/62	34	153	153
Chart—Safeway Store 646, 1400 E. Washington Blvd., Petaluma, Calif., June 29, 1962	35	153	153

Document	Plaintiffs' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
Observations made at Pt Locations, by Harold Halls July 24-25, 1962..	36	153	154
Letter from D. D. Wile to L. E. Lyon dated Feb. 9, 1955	37	424	424
Photograph, Kramer Thaw System..	38	841	
Sheet from Refrigeration Service & Contracting, March 1963, "the companion to Thermobank . . . Kramer Thaw System	39	897	897
Article by Otto J. Nussbaum, "Automatic Defrost Utilizing a latent heat source"	40	904	904
Photographs, Unimart Burbank Store, 2311 Hollywood Way, 6-3-64, 6-4-64	41	1548	1548

Document	Defendants' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
File Wrapper of U.S. Patent No. 2,953,906, dated Sept. 27, 1960, for Refrigerant Flow Control Apparatus	C	96	350
Article by Otto J. Nussbaum entitled "The Thermobank Simplified" from March 1946 Refrigeration Industry	E	96	
Line Diagram for Kramer Thermobank No. 2765-5, Dated 9-7-45	F	96	1083
Drawing No. 5425, Surge Tank	G	96	1083
Drawing No. A-6756, Diagrammatic Line Layout for Special Thermobank System (York Corp.), March 16, 1950	H	96	1083
Drawing No. G-6211, Line Diagram of Thermobank Systems Using Two Evaporators With One Thermobank and Surge Tank, 2-9-49	I	96	1083
Drawing No. 5357, Installation of Extra Surge Tank with Large Thermobank Systems, dated 4-11-47	J	96	1089
Bulletin RI-122, Surge Tank for Large Capacity Thermobank Systems, Print No. 5357	K	96	1089
Letter to Frigidaire Sales Corp. from Otto J. Nussbaum of Kramer-Trenton Company, dated June 18, 1947	L	96	1089
Letter to Acar Supply Company from Otto J. Nussbaum of Kramer-Trenton Company Dated Oct. 7, 1947	M	96	1091
Letter to Gibson Engineering from Otto J. Nussbaum of Kramer-Trenton Company Dated Mar. 25, 1948	N	96	1091

Document	Defendants' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
Article by Thomas H. Hart, entitled "Hot Gas Defrosting in Commercial Refrigeration", from Refrigerating Engineering, Feb. 1951 (Part I)	P	96	1148
Part II of Exhibit P	Q	96	1148
Bulletin, "Kramer presents a new kind of Thermobank", Copyright 1956 Kramer-Trenton Co.	S	96	1260
Bulletin 12C5a, "Recold Vapomatic Defrosting"	T	96	1232
Bulletin, "Vapomatic Coils", 12C9a	W	96	1232
Bulletin, "Vapomatic Units" (Patent No. 2,953,906)	X	96	1232
Bulletin, "Installation Instructions for Larkin Low Temperature Humi-Temp Units Equipped with Frost-O-Trol Automatic Hot Gas Defroster"	Y	96	1082
Photograph, accumulator trap mounted over top of cooler, McKays Mkt.	AA	96	302
Drawing, Blower & Compressor, Meat Cooler, McKays Mkt.	BB	233	302
Physical Exhibit (Stereo Slide)	CC	233	283
Drawing, Two Hot Gas Defrosts, New Defroster, George Orr Walk-in Cooler, Eugene Ore.	DD	233	283
Physical Exhibit (Stereo Slide)	EE	233	283
Drawing, Remote McCray Ice Cream Case Accumulator Trap Defrost 30 Min.	FF	233	302
Drawing, Accumulator Trap	HH	233	350
Physical Exhibit (Book of Prior Art)	II	233	1474
Physical Exhibit (Book of Prior Art)	JJ	233	1474

Document	Defendants' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
Answers To Defendants' First Interrogatories to Plaintiff, dated December 13, 1961	KK	233	753
Bulletin P480, April 1960, List Prices Kramer Thaw System	LL	307	753
Affidavit of Daniel D. Wile in Response to Motion for Summary Judgment, Feb. 15, 1962	MM	233	753
Plaintiffs' Answers to Defendants' Interrogatories 24 Through 32, Oct. 10, 1962	NN	91	602
Plaintiffs' Response to Request for Admissions Under Rule 36	QQ	307	1474
Plaintiffs' Response to Interrogatories Nos. 33 to 90, Inclusive, March 1, 1963	RR	307	753
Bulletin 16R, Thermobank by Kramer, Copyright, 1949	WW	233	1082
Certified copy of Affidavit of Daniel D. Wile filed Sept. 14, 1959 (Patent No. 2,953,906, Sept. 27, 1960, Lester K. Quick)	XX	620	753
U.S. Patent No. 2,675,683, April 20, 1954, W. L. McGrath et al., Control Means for Refrigeration Systems	YY	620	753
Bulletin 204 featuring Air Cooled Hermetic Condensing Units ⅛ to 3 H.P.	ZZ	620	1260
Article by Paul Reed, "Refrigeration Problems And Their Solution" Reprinted from Air Conditioning & Refrigeration News, May 14, 1956	AB	620	753
Physical Exhibit (Drawing)	AC	693	1375
Physical Exhibit (Drawing)	AD	693	1149
Physical Exhibit (Drawing)	AE	693	1205

Document	Defendants' Exhibit No.	Marked for Ident. Record Page No.	Received in Evidence Record Page No.
Physical Exhibit (Drawing)	AF	693	1375
Physical Exhibit (Drawing)	AG	722	1375
Physical Exhibit (Drawing)	AI		1205
Physical Exhibit (Drawing)	AJ		1205
Physical Exhibit (Drawing)	AK		1381
Physical Exhibit (Drawing)	AL		1383
Physical Exhibit (Drawing)	AM		1149
Physical Exhibit (Drawing)	AN		1168
Physical Exhibit (Drawing)	AO		1177
Physical Exhibit (Drawing)	AP		1382
Physical Exhibit (Drawing)	AQ		1168
Physical Exhibit (Drawing)	AR		
Physical Exhibit (Drawing)	AS		
Physical Exhibit (Drawing)	AT	1116	1149
Notes Dated 6-11-64 — T520L Thaw System T520 Evaporator — T3 accumulator	AU	1527	1527